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Alpha-synuclein in the central nervous system of the carp (Cyprinus Carpio). Immunohistochemical study

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Alpha Synuclein (α-Syn) is a 140 amino acid protein, highly expressed in the central nervous system (CNS) of different vertebrates and abnormally accumulated in Parkinson's disease and other degenerative disorders, known as synucleinopathies. Although most physiological functions of α-Syn remain elusive, this protein possesses chaperone properties and it is involved in vesicular storage and docking, neurotransmitters release and synaptic plasticity. Although non mammalian synucleins have been relatively well-characterized, present knowledge about their cellular localization is still scarce. Ciprinids have been used as piscine models for Parkinson's disease [1] and an α-Syn gene has been recently sequenced in Cyprinus carpio [2]. Through our previous study on α-Syn expression in non mammalian vertebrates [3], we have described the distribution of α-Syn immunoreactivity in the carp brain and spinal cord, by using a novel monoclonal antibody (3D5) against α-Syn [4]. 3D5 distribution was also compared with monoaminergic, cholinergic and serotoninergic pathways. Present results show that α-Syn immunoreactivity is mainly distributed in motor and reticular pathways, throughout the brainstem and the spinal cord. Moreover, α-Syn is also localized into small beaded fibers innervating the main forebrain regions including basal telencephalon, preoptic region and hypothalamus. In motor and reticular nuclei α-Syn is clearly co-distributed with ChAT. Therefore, the putative α-Syn positive neurons may represent a subpopulation of cholinergic neurons. The colocalization between α-Syn and ChAT in the same neurons needs to be verified by confocal microscopy. The knowledge of α-Syn cellular distribution in teleosts adds new prospectives to physiological roles of synucleins during evolution and neurological disorders.

References

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